Article

Evaluation of Total Quality Management in Turkish Pharmaceutical Companies: A Case Study

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Abstract: Corporate sustainability is one of the most challenging issues in superior organizations, and is always one of the main concerns of top managers. The importance of quality management in organizations—especially as total quality management—is considered to be one of the most important indicators of sustainability. We cannot achieve sustainability and its important sub-parameters—including economic and social sustainability—by merely employing the value of knowledge creation and knowledge sharing, without also focusing on customers, leadership, and process management. We designed appropriate questionnaires to test this premise, and then distributed and collected them from various reputable pharmaceutical companies in Turkey. We recorded the opinions of managers, supervisors, and deputies of different departments at various organizational levels. To analyze the data, SPSS software—one of the well-known applications in this field—was used. The new regular economy introduces new requirements for newly built public universities or pharmaceutical companies; therefore, their transformation and development are imminent. For example, colleges should comply with the new requirements of economic and social transformation for higher education, innovate their talent training models, and cultivate higher ideological standards and morality while instilling strong practical ability in their graduates to serve society. The results of this study not only illustrate the positive effects of total quality management on firms' sustainability, but also validate knowledge management and its sub-variables, including knowledge creation and sharing. In addition, they confirm the mediating role of sub-variables, including knowledge creation and knowledge sharing in companies, influencing the effects of total quality management on the sustainability of companies.

Keywords: corporate sustainability; knowledge management; total quality management; pharmaceutical companies

1. Introduction

Today's fiercely competitive business market, stringent global environmental protection regulations, and increasing customer focus on product quality and characteristics force companies to follow established, effective strategies regarding total quality management (TQM) and knowledge management (KM) [1–4]. Business reform requires better comprehension of business culture and efficient human resource management by adopting new concepts to create the short-, middle-, or long-term benefits to business performance. Business owners must pay special attention to analyzing and recognizing such changes by decision-makers to prevent any side effects that could lead organizations toward failure. Organizational changes involve changes in business culture, processes, human behavior, opportunities, growth, and business performance as a whole; therefore, managers should make change management a priority by adopting an effective and sufficient course of action to maintain business stability and growth.

KM plays a crucial part in developing employee behavior and efficiency in terms of self-managed teams, team spirit, employee productivity, and morality. It also has a huge effect on company development, profitability, and business performance in light of global business changes and risks.

TQM today is one of the basic requirements for pharmaceutical companies to develop strong business goals, strategies, culture, learning, information sharing, and knowledge creation and conversion among employees at all levels of the business structure. Additionally, combined with customer focus, it can eliminate waste, because quality raises customer satisfaction and improves competitive position.

This research, for the first time, seeks to identify the effects of TQM through KM as a mediator on corporate sustainability (CS) in pharmaceutical companies in Turkey, and presents their crucial role in this industry.

In order to identify important research conducted between 2014 and 2021, the following studies were investigated:

Jabeen et al., in 2014, presented the positive effects of both TQM and KM on the business performance of small and medium enterprises (SMEs) in their research [5]. In 2019, Abbas and Sağsan presented the crucial role of knowledge management practices in obtaining sustainability in organizations [1]. Subsequently, Abbas conducted other research to illustrate the impact of total quality management on corporate sustainability through the mediating effect of knowledge management in the manufacturing industry in Pakistan [6]. Later, Zhang et al., in similar research, used a different case study to represent the positive effects of both TQM and KM on sustainability [7].

2. Literature Review

2.1. The Total Quality Management (TQM) Concept

The European Foundation for Quality Management (EFQM), the Swedish Quality Award (SIQ), and the Malcolm Baldrige National Quality Award (MBNQA) are the models that set the standards for implementing TQM and considering its fundamental worth. The US MBNQA model combines soft and hard views of TQM. This model has proven to be very worthy and valuable in a variety of different frameworks in reforming operational and management structures. The model includes six elements: leadership, strategy development, customer orientation, performance monitoring, employee participation, and knowledge and evaluation [8–10]. Taking into account the breadth and effectiveness of this template, we used it to study the connections between TQM, KM, and CS.

The implementation of TQM first started in Japan following World War II, and reached the United States in the 1980s. It spread largely in American manufacturing companies that were competing with Japan [11,12]. Through full adoption and effective practices, TQM was shown to have many benefits, including improvements in employee engagement, effective communication, productivity, quality, and customer satisfaction, as well as reducing the costs incurred due to poor quality and rework [13–16].

TQM is a broad idea that has many definitions. It has been defined as an improved competitive position, where the consumer determines the output, thereby ensuring consumer satisfaction [17,18]. The focus of TQM is to exceed customer expectations and enable continuous advancement and long-term organizational achievements. These include disaster risk reduction, performance monitoring, group cooperative learning, quality, and improvement strategies across all teams within the enterprise [19,20].

"Innovative TQM literature contains TQM concepts such as customer satisfaction, cost reduction, leadership and senior management commitment, training and education, team management, and culture" [21]. According to Easton and Jarrell [7], TQM considers process focus, system improvement, company-wide focus, customer focus, fact-based management, participation, employee development, cross-functional management, performance, supplier relationships, and overall quality. Management is considered to be a crucial competitive strategy. The principles of TQM include instilling a culture of quality, quality chains, quality assurance, and commitment to continual improvement in upper management [22].

CS is the company's power to inflict minimal-to-no harm to the company and society. It does this through utilizing natural resources—especially non-renewable resources [23]. With the use of proper CS and business strategies, organizations can attain increased levels of achievement [24]. This can encourage companies to consider the impacts of their actions and decision-making over longer periods of time [25]. Many factors motivate organizations to adopt sustainable development strategies, such as ethics, law, and business. In addition, due to the increasing pressure from stakeholders' demands and customers' assumptions, companies must assign some tools for environmental and economic growth plans [26].

Pressure from associates and the very competitive business markets are forcing companies to tailor their actions to sustainability, decreasing costs, and differentiation [27]. The resource-based view of a company emphasizes its capabilities through the company and its resources. The resource-based view provides a basis that clarifies the connection between TQM and the activities of the company [28]. It is considered that TQM tends to enhance performance in companies by encouraging expansion of assets, immersion in the company's culture, establishing socially multifaceted relationships, and providing information—particularly tangible information [29].

The green aspects of sustainability reflect organizations' efforts to protect the natural ecosystem for a stable world [30], such as reducing air and water pollution, efficient consumption of natural resources, cost reduction in the usage of resources, and conservation of natural resources. Protecting the environment also tends to rely on the conservation and control of energy and resources—especially non-renewable ones. These resources are very important and valued for sustaining life [31]. Companies cannot neglect their spiritual obligations to the community, culture, and ecosystem. Customers, governments, and the public hope that companies actively participate in environmental and social enhancement plans to counter the detrimental effects of their corporate activities [32]. Companies that care about natural environment tend to positively affect customer and employee satisfaction in practice.

The social and environmental aspects of sustainability are conceptual in comparison to economic sustainability. The social aspect of sustainable development implies moral actions carried out by companies for social welfare before their financial and commercial concerns [33]. Donations to non-governmental agencies, involvement in social literacy programs, improving the consistency and accountability of goods and services, etc. [34,35], are examples of social welfare activities.

TQM is committed to constant development, focusing on achieving effective use of resources and, consequently, attaining a permanent position and durability. TQM and quality of service are the highest priorities for many companies, and their actions are crucial to both the service and manufacturing industries [36]. Consequently, several organizations claim to update sustainable and environmentally friendly processes in company activities. Since TQM is considered to be a management system, it can be extended to cover all aspects of sustainable development, because the goal of TQM is to support the company's activities and resources successfully [37]. Inferior products or services lead to poor economic sustainability and waste of natural resources. This results in the inability to achieve sustainability in the environment [38].

2.2. Evolution of Corporate Sustainability (CS)

From a diversity perspective, the emphasis and creation of sustainability are evident in a variety of changes globally [39]. Previously, they were focused on sustainable development and the many transformations reported in the literature [40]. From the 1970s to the 1980s, most of the studies were focused on social reporting, but the focus turned to environmental reporting in the 1990s.

Initially, businesses modify terminology without any basis to reflect the language of corporate sustainability. Then, as a form of cost management, they re-engineer the business process to minimize the costs of water and energy use and increase financial efficiency. Thirdly, during stakeholder involvement, companies consider employees and

customer loyalty. The fourth step is to interact by producing corporate sustainability reports on these initiatives. Sustainability is the final step, which includes fundamental changes in business practices and major restructuring and reform of processes. In these circumstances, a promising future appears to be offered by corporate sustainability, as its essence discusses and captures the most critical social concerns about the relationship between society and business.

Sustainability in organizations is related to all of the involved departments. In other words, the whole supply chain must be committed to green behavior and practices to have optimal operational, environmental, and economic performance [41]. The supply chain contains many areas, including suppliers, production, logistics, and energy consumption [42–45]. Focusing on green energy consumption and reducing the employed energy benefits the related organization and, consequently, society, by ensuring environmental stewardship [46–48].

2.3. Knowledge Management (KM) Definition

Being a complicated concept to define and measure, knowledge is outlined in a descriptive-to-functional range, with detailed-to-general outlines. Therefore, KM concepts can be defined as information, data, beliefs, truth, and personal experiences [49]. We concentrate on defining which element encompasses knowledge the most. According to Anjaria, knowledge is defined by a fluid mix of framed experiences, values, contextual information, and expert insight, providing a framework for evaluating and incorporating new experiences and information [50].

There has been no consensus on the concept of KM. KM has been described as "a systematic, explicit, deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets" [51]. Another definition describes KM as the method of apprehending a cumulative skill of a company and spreading it as far as possible to capitalize on it [52]. According to Tiwana, KM refers to managing knowledge from the initial knowledge to its application to achieve market principles and cause an increase in competitive advantages [53]. KM as a management function refers to creating, locating, and managing the flow of information and data within an organization to encompass knowledge that is used successfully and effectively to achieve company goals in the long term [54]. Therefore, KM is a plan to send correct information and experiences to the correct users to support them in sharing and bringing that information into practice, with a trend that aims to enhance business activities [55].

Many scholars and researchers have studied the transformation of local entrepreneurship from the perspective of talent training objectives and the essence of university education, and discussed the basics. Moreover, they valued orientation and essential requirements of transformation and development of local colleges and universities. Some scholars have investigated this in many countries from the perspectives of education management, resource allocation, operation mechanisms, and enrollment system reform. Other scholars have investigated and discussed the internal driving forces and interest from the perspectives of economics and sociology, providing a new research perspective.
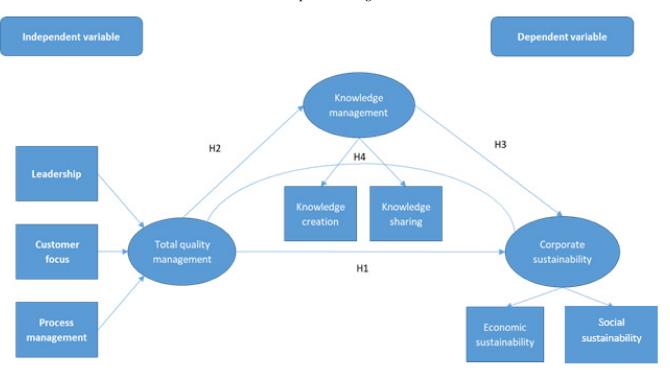
2.4. The Combination of TQM, KM, and CS

A poor-quality product or service can not only lead to poor economic sustainability [6], but also can result in waste of natural resources and, therefore, failure to achieve environmental sustainability. Therefore, total quality management has a significant and positive impact on corporate sustainability.

Since the focus of the TQM philosophy is continuous improvement and achieving efficient use of resources in the long run, it is directly related to durability as one of the CS assumptions. Both TQM and CS are top priorities for organizations, and their implications are vital for all manufacturing and service industries. Therefore, organizations should use environmentally friendly methods and sustainable development in implementing their goals [36]. It should be noted that TQM is a management system; hence, it can be

implemented in such a way that it includes all dimensions of sustainable development, because the purpose of TQM is the efficient use of resources in addition to improving organizational performance [37]. The poor quality of a product or service can lead to waste of natural resources, in addition to a lack of economic sustainability [6] and, thus, lack of environmental sustainability. Therefore, TQM has a positive and significant effect on company sustainability.

Sustainability is known to be focused on three main components: sustainable growth, natural ecosystems, and personal accountability as part of social and economic issues [56]. A core principle of sustainable development is to attain the sustainable fulfillment of human wants. Fulfillment needs resources from nature and produced by human beings. In the knowledge of society, the integration of KM and sustainable development is very crucial. According to Mardani et al. [57], knowledge is a key driver of growth. Abukhait et al. [58] argued that KM is also a crucial component of improved economic operations. Knowledge-based organizations are not only creative, but also look for fresh directions in sustainable development. KM simplifies the development of the knowledge market sustainably, based on environmental, social, and economic factors [59]. KM corporations encourage knowledge exchange both inside and outside of organizations. Institutions place great emphasis on coordinating KM strategies and comprehensive management strategies for all forms of sustainable development. To achieve sustainability, KM processes help corporations to answer different questions such as "what to do", "working hours", etc. [60]. The research model is depicted in Figure 1.

Figure 1. The research model.

2.5. The Roles of Sustainability and TQM in the Pharmaceutical Industry

The Turkish Pharmaceutical Manufacturers Association stated on World Pharmacists' Day that "Turkey is striving to become a hub of the world pharmaceutical industry thanks to its strong export network, geographical location, population and manufacturing plants". Turkey has 100 pharmaceutical factories, with 11 factories producing pharmaceutical raw materials. There are 680 pharmaceutical companies and 33 pharmaceutical research and development centers in Turkey, with a total of 40,000 employees, and the Turkish pharmaceutical industry produces more than 12,000 products. About 88% of pharmaceutical products consumed in Turkey (by volume) are produced in the country. The Turkish

pharmaceutical industry exports to about 180 destinations, including the European Union, North Africa, East Asia, and the Middle East. The industry's exports increased by 3.27% to USD 8.1 billion in 2020—the highest in the industry's history. The market value of medications manufactured in Turkey also increased by 7.17% to USD 7.6 billion in 2020.

Today, in many countries, steps are being taken to transfer knowledge and technology from academic institutions so that the value created in academia can lead to improvements in the efficiency and effectiveness of industrial units and, ultimately, economic prosperity. Moreover, universities are taking a more serious approach regarding their contribution to the growth and prosperity of the economy. Industries have come to the conclusion that they must use constructive academic interactions in developing approaches to reduce opportunity costs. In today's complex world, competition provides the foundation to create lasting value, and there is no escape from it. Indeed, Turkish pharmaceutical manufacturers are no exception, and need to employ different aspects of quality and knowledge management to ensure sustainability.

Due to the toxicity of the materials used in the pharmaceutical industry, the cost of disposing of their waste is always high. Furthermore, especially in the light of COVID-19 pandemic, the rate of drug damage is now much higher. Hence, such waste products are serious threats to environmental sustainability. In addition, the pharmaceutical industry has detrimental effects on the lives and health of people living near drug-related producers and wastewater treatment plants, and the destructive effects of waste and pharmaceutical products on aquatic animals in polluted waters or animals in the vicinity of these waters cannot be ignored [61]. To deal with these problems, we can suggest environmentally friendly packaging, improving waste management, reducing the toxicity of drugs if possible, and guiding and informing the community about the proper use and disposal of drugs. These steps can ultimately contribute to environmental sustainability [62]. In Turkish pharmaceutical companies, for efficient management of production effluents, measures taken include the neutralization and decontamination of wastewater and preventing it from entering the public effluent network. These treated effluents are used to wash and irrigate green spaces to save drinking water. In addition, the design, construction, and operation of wastewater treatment systems in accordance with the regulations and instructions approved by the Department of the Environment are always on the agenda. In addition, to protect the environment and maintain clean air by preventing the spread of pollutants and chemical dust distributed by industrial exhausts and fans, strong particle-absorbing filters are used that comply with standard hygienic guidelines [63]. To better comply with the requirements, the above filters are replaced every 6 months. Such activities represent the value and cost of being sustainable in this country and industry.

In the pharmaceutical industry, quality is the key issue that needs to be addressed above all else, and there are many rules, regulations, and controls to ensure this. Therefore, in order to achieve such a goal, a quality management system that includes all relevant units of the organization and personnel is necessary. In pharmaceutical companies, various functions related to quality management and their relationships are considered to be important. Quality management is at the forefront of every organization's policy towards quality implementation. The quality of raw materials and packaging is very important in drug production. The quality of materials and the form of packaging, the number of drugs in each package according to consumption dosage, stability tests on packaging under controlled conditions such as temperature and humidity, and many other tests are performed to ensure that the medicine is packaged with the highest quality and will maintain its quality over time. In a study conducted by Haleem et al. [64], the fundamental role of quality in the pharmaceutical industry was stated. Another study illustrated the fundamental role of total quality management through analyzing questionnaires sent to pharmaceutical companies in Iran [65]. In a recent study by Parmaksiz et al. [66] in Turkey, this country was reported as having the world's first full pharmaceutical industry with governance, transparency, and control systems.

3. Methodology

3.1. Hypothesis Development

Based on this study's problem and objectives, many hypotheses were created and tested based on the study questions. The study's main question focused on the effect of TQM on CS through KM as a mediator in pharmaceutical companies in Turkey. The main hypotheses were posed to answer question 1 as follows:

Hypothesis 1

H$_1$. *There seems to be a positive effect of TQM on CS and its sub-variables (i.e., economic sustainability and social sustainability) in pharmaceutical companies in Turkey.*

H$_{1-1}$. *There seems to be a positive effect of TQM on the economic sustainability of pharmaceutical companies in Turkey.*

H$_{1-2}$. *There seems to be a positive effect of TQM on the social sustainability of pharmaceutical companies in Turkey.*

Hypothesis 2

H$_2$. *There seems to be a positive effect of TQM on KM and its sub-variables (i.e., knowledge creation and knowledge sharing) in pharmaceutical companies in Turkey.*

H$_{2-1}$. *There seems to be a positive effect of TQM on the knowledge creation of pharmaceutical companies in Turkey.*

H$_{2–2}$. *There seems to be a positive effect of TQM on the knowledge sharing of pharmaceutical companies in Turkey.*

Hypothesis 3

H$_3$. *There seems to be a positive effect of KM on CS and its sub-variables (i.e., economic sustainability and social sustainability) in pharmaceutical companies in Turkey.*

H$_{3-1}$. *There seems to be a positive effect of KM on the economic sustainability of pharmaceutical companies in Turkey.*

H$_{3-2}$. *There seems to be a positive effect of KM on the social sustainability of pharmaceutical companies in Turkey.*

Hypothesis 4

H$_4$. *There seems to be a mediation effect of KM on the relationship between TQM and CS in pharmaceutical companies in Turkey.*

3.2. Data Collection

This study used the original data collection method. Questionnaires were used to provide first-hand data. These data were statistically tested and analyzed. Testing the hypotheses proposed from the literature and earlier research was the primary objective of data collection. In this study, the main data were collected by questionnaire. This was chosen as the preferred method for obtaining actual data because survey questionnaires can be monitored and translated to predictive results.

The study questionnaire was collected using snowball techniques. The questionnaire was sent to employees working in five different pharmaceutical companies in Turkey. Electronic surveys allowed rapid data collection and analysis processes. Data were obtained from May 2020 to July 2020. All statistical data collected were finally processed through statistical analysis techniques.

3.3. Sampling Design and Target Population

Sampling techniques are crucial in improving the efficiency of data collection and ensuring that the sample represents the population. It is believed that sampling can

decrease how much data should be collected, and can provide conclusions about the whole population [67]. The objective of this study was to examine the positive effects of TQM and CS in pharmaceutical companies via KM. The target population for this study was pharmaceutical companies in Turkey.

The research questionnaire was collected using the snowball method and sent to employees working in pharmaceutical companies in Turkey for the pilot study. Electronic surveys allowed rapid data collection and analysis processes. This enabled the researchers to collect large amounts of data from respondents in a short period of time. All statistical data collected were processed through statistical analysis techniques in order to draw conclusions.

3.4. Sample Data Analysis

A questionnaire covering all variables of the study was developed and distributed to the study sample. The respondents' answers were distributed according to a five-point Likert scale. To examine the reliability of the questionnaire, subsequent tests were conducted. For validity purposes, we used the method of Cronbach's alpha coefficient for testing the internal consistency of the questions to ensure that the questionnaire was valid as a tool designed to collect the necessary data.

By employing convenience sampling, and considering whether the managers active in pharmaceutical companies in Istanbul were available to explain the purpose of the study, the research was initiated. Permission was given by the managers to send the survey link to the employees of different functional areas and departments involved with the chosen variable of the study.

4. Results and Discussions

Five pharmaceutical companies in Istanbul agreed to participate. All in all, 170 questionnaires were distributed to all managers, heads, and assistants of these Turkish pharmaceutical companies. The questionnaire is provided in Appendix A. Ultimately, 134 questionnaires were retrieved. Thus, the number of questionnaires subjected to statistical analysis was 134. Table 1 presents the demographic information of the survey participants.

Table 1 shows the study sample distribution according to the demographic factors of the respondents, and illustrates that most of the participants were male, with a total of 100 respondents, equivalent to 74.6%, while only 34 were female, equivalent to 25.4% of the overall sample.

The results for education show that the most commonly held level of education was a bachelor's degree, with a total of 90 respondents, equivalent to 67.2%, while 29 respondents held a master's degree, equivalent to 21.6%; 11 respondents held a diploma, equivalent to 8.2%, while 4 had a PhD, accounting for 3% of the overall study sample. The sample age was mostly in the range of 30–35 years, with a total of 52 respondents, equivalent to 38.8% of the sample; 42 respondents were less than 30 years of age, equivalent to 31.3%, while 29 respondent's were aged 35–40 years, equivalent to 21.6%, and 11 respondents were aged 45 years or over, equivalent to 8.2% of the overall study sample.

In terms of years of experience, 36 respondents were in the range of less than 5 years, equivalent to 26.9%, while 35 respondents each were in the ranges of 5–10 years and 10–15 years, equivalent to 26.1%; 16 respondents were in the range 15–20 years, equivalent to 11.9%, and 12 respondents had over 20 years of experience, equivalent to 9% of the overall study sample.

Table 1. Distribution of the survey participants by demographic factors.

Variable	Category	Frequency	Percentage
Gender	Male	100	74.6%
	Female	34	25.4%
	Total	134	100.0%
Level of education	Bachelor's	90	67.2%
	Diploma	11	8.2%
	Master's	29	21.6%
	PhD	4	3.0%
	Total	134	100.0%
Age	Less than 30 years	42	31.3%
	30–35 years	52	38.8%
	35–40 years	29	21.6%
	45 years and over	11	8.2%
	Total	134	100.0%
Years of experience	Less than 5 years	36	26.9%
	5–10 years	35	26.1%
	10–15 years	35	26.1%
	15–20 years	16	11.9%
	More than 20 years	12	9.0%
	Total	134	100.0%

4.1. Reliability and Constancy of the Study Variables

To guarantee the validity of the research instrument to measure all variables in the study, we carried out several procedures.

The study tool was presented to 10 professors at Turkish public and private universities with scientific research experience and specialism in the subject matter for a pilot study. Cronbach's alpha analysis was used to examine the accuracy and reliability of the questionnaires. The following table illustrates the test results.

Table 2 displays that Cronbach's alpha coefficient of TQM as a whole was 0.92, while that of the dependent variable (CS) was 0.81, and that of the mediator variable (KM) was 0.84, all of which are greater than 0.70, indicating the validity of the tool to achieve the study's objectives.

Table 2. Cronbach's alpha coefficients of the study dimensions.

No.	Dimensions	Cronbach's Alpha Coefficients
	Knowledge creation	0.74
	Knowledge sharing	0.79
1	KM	0.84
	Customer focus	0.8
	Process management	0.83
	Leadership	0.86
2	TQM	0.92

Table 2. *Cont.*

No.	Dimensions	Cronbach's Alpha Coefficients
	Corporate social sustainability	0.75
	Corporate economic sustainability	0.73
3	CS	0.81

4.2. Descriptive Statistical Analysis

Table 3 displays arithmetic ranges and percentage points of the sample results for each sub-variable of the independent variables of the study, along with the overall results.

Table 3. Independent variables: TQM sub-variables.

No.	Variables	Mean	Standard Deviation	Rank	Degree of Significance
1	Customer focus	4.25	0.584	1	High
2	Process management	4.105	0.629	3	High
3	Leadership	4.107	0.671	2	High
4	TQM	4.11	0.611		High

4.3. Hypothesis Tests

To test the study's hypotheses, several statistical methods were used, including multiple and simple regression, a path method analysis, and variance analysis. The results were as follows:

H$_1$. *There seems to be a positive effect of TQM on CS and its sub-variables (i.e., economic sustainability and social sustainability) in pharmaceutical companies in Turkey.*

Table 4 indicates that the explained variance was 0.457; that is, the independent variables combined (i.e., customer focus, process management, and leadership) accounted for 45.7% of the CS in pharmaceutical companies in Turkey. In addition, the following results were found:

— There was a statistically significant positive impact of process management on CS in pharmaceutical companies in Turkey, as the value of t was 5.38, with a statistical significance of 0.000.
— There was a statistically significant positive impact of leadership on CS in pharmaceutical companies in Turkey, as the value of t was 4.34, with a statistical significance of 0.000.
— There was no statistically significant positive impact of customer focus on CS in pharmaceutical companies in Turkey, as the value of the test statistic was -0.836, with a statistical significance of 0.405.

Table 4. Multiple regression analysis of the impact of TQM on CS.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Sig.		B	Standard Error	t	Significance
CS	0.676	0.457	35.309	0.000	(Constant)	0.029	0.353	2.918	0.004
					Customer focus	−0.086	0.103	−0.836	0.405
					Process management	0.465	0.086	5.380	0.000
					Leadership	0.361	0.083	4.340	0.000

H$_{1-1}$. *There seems to be a positive effect of TQM on the economic sustainability of pharmaceutical companies in Turkey.*

Table 5 shows that the explained variance was 0.344, meaning that the independent variable TQM accounted for a value of 34.4% of corporate economic sustainability in pharmaceutical companies in Turkey. Moreover, we found that there was a statistically significant positive effect of TQM on corporate economic sustainability in pharmaceutical companies in Turkey, as the value of t was 8.234, with a statistical significance of 0.000.

Table 5. Simple regression analysis of the impact of TQM on corporate economic sustainability.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Corporate economic sustainability	0.587	0.344	67.793	0.000	(Constant)	1.373	0.338	4.067	0.000
					TQM	0.667	0.081	8.234	0.000

H$_{1-2}$. *There seems to be a positive effect of TQM on the social sustainability of pharmaceutical companies in Turkey.*

Table 6 shows the explained variance was 0.24, meaning that the independent variable TQM as accounted for a value of 24% of the corporate social sustainability in pharmaceutical companies in Turkey. We also found that there was a statistically significant positive impact of TQM on the corporate social sustainability in pharmaceutical companies in Turkey, as the value of t was 6.384, with a statistical significance of 0.000.

Table 6. Simple regression analysis of the impact of TQM on corporate social sustainability.

Department.	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Corporate social sustainability	0.49	0.24	40.751	0.000	(Constant)	1.629	0.372	4.382	0.000
					TQM	0.57	0.089	6.384	0.000

H$_2$. *There seems to be a positive effect of TQM on KM and its sub-variables (i.e., knowledge creation and knowledge sharing) in pharmaceutical companies in Turkey.*

Table 7 indicates that the explained variance was 0.455; that is, the independent variables combined (i.e., customer focus, process management, and leadership) accounted for 45.5% of the KM in pharmaceutical companies in Turkey. In addition, the following results were obtained:

Table 7. Multiple regression analysis of the impact of TQM on KM.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
KM	0.674	0.455	35.318	0.000	(Constant)	1.075	0.311	3.453	0.001
					Customer focus	0.102	0.091	1.121	0.265
					Process management	0.232	0.076	3.032	0.003
					Leadership	0.368	0.074	5.004	0.000

There was a statistically significant positive effect of process management on KM in pharmaceutical companies in Turkey, as the value of t was 3.032, with a statistical significance of 0.003.

There was a statistically significant positive impact of leadership on KM in pharmaceutical companies in Turkey, as the value of t was 5.004, with a statistical significance of 0.000.

There was no statistically significant positive impact of customer focus on KM in pharmaceutical companies in Turkey, as the value of the test statistic was 1.121, with a statistical significance of 0.265.

H₂-₁. *There seems to be a positive effect of TQM on the knowledge creation of pharmaceutical companies in Turkey.*

Table 8 shows that the explained variance was 0.226, meaning that the independent variable TQM accounted for 22.6% of knowledge creation in pharmaceutical companies in Turkey. Moreover, we found that there was a statistically significant positive effect of TQM on knowledge creation in pharmaceutical companies in Turkey, as the value of t was 6.176, with a statistical significance of 0.000.

Table 8. Simple regression analysis of the impact of TQM on knowledge creation in pharmaceutical companies in Turkey.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Knowledge creation	0.475	0.226	38.146	0.000	(Constant)	2.084	0.326	6.395	0.000
					TQM	0.484	0.078	6.176	0.000

H₂-₂. *There seems to be a positive effect of TQM on the knowledge sharing of pharmaceutical companies in Turkey.*

Table 9 shows that the explained variance was 0.349, meaning that the independent variable TQM accounted for 34.9% of knowledge sharing in pharmaceutical companies in Turkey. Moreover, we found that there was a statistically significant positive effect of TQM on knowledge sharing in pharmaceutical companies in Turkey, as the value of t was 8.382, with a statistical significance of 0.000.

Table 9. Simple regression analysis of the impact of TQM on knowledge sharing in pharmaceutical companies in Turkey.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Knowledge sharing	0.591	0.349	70.265	0.000	(Constant)	1.043	0.341	3.058	0.003
					TQM	0.688	0.082	8.382	0.000

H₃. *There seems to be a positive effect of KM on CS and its sub-variables (i.e., economic sustainability and social sustainability) in pharmaceutical companies in Turkey.*

Table 10 shows that the explained variance was 0.344, meaning that the independent variable of KM accounted for 34.4% of the CS of pharmaceutical companies in Turkey. Moreover, we found that there was a statistically significant positive effect of KM on the CS of pharmaceutical companies in Turkey, as the value of t was 8.218, with a statistical significance of 0.000.

Table 10. Multiple regression analysis of the impact of KM on CS.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
CS	0.586	0.344	67.53	0.000	(Constant)	1.985	0.247	8.024	0.000
					KM	0.495	0.06	8.218	0.000

H₃₋₁. *There seems to be a positive effect of KM on the economic sustainability of pharmaceutical companies in Turkey.*

Table 11 shows that the explained variance was 0.304, meaning that the independent variable of KM accounted for 30.4% of corporate social sustainability in pharmaceutical companies in Turkey. In addition, we found that there was a statistically significant positive effect of KM on corporate social sustainability in pharmaceutical companies in Turkey, as the value of t was 7.507, with a statistical significance of 0.000.

Table 11. Simple regression analysis of the impact of KM on the corporate social sustainability of pharmaceutical companies in Turkey.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Corporate social sustainability	0.551	0.304	56.36	0.000	(Constant)	2.19	0.243	9.002	0.000
					KM	0.437	0.058	7.507	0.000

H₃₋₂. *There seems to be a positive effect of KM on the social sustainability of pharmaceutical companies in Turkey.*

Table 12 shows that the explained variance was 0.246, meaning that the independent variable of KM accounted for 24.6% of the corporate social sustainability in pharmaceutical companies in Turkey. We also found that there was a statistically significant positive effect of KM on the corporate social sustainability in pharmaceutical companies in Turkey, as the value of t was 6.495, with a statistical significance of 0.000.

Table 12. Simple regression analysis of the impact of KM on corporate social sustainability in pharmaceutical companies in Turkey.

Department	Model Summary		ANOVA		Coefficient				
	R	R-Squared	F	Significance		B	Standard Error	t	Significance
Corporate social sustainability	0.496	0.246	42.18	0.000	(Constant)	2.462	0.239	10.294	0.000
					KM	0.385	0.059	6.495	0.000

H₄. *There seems to be a mediation effect of KM on the relationship between TQM and CS in pharmaceutical companies in Turkey.*

Mediating analysis: independent variable (IV); dependent variable (DV); mediating variable (MV).

Table 13 displays the results of path analysis for this hypothesis if the results of the statistical analysis show that there is a statistically significant impact of the independent variable on the dependent variable through the mediator, with the calculated value of Chi2 equal to 13.979.

Table 13. Path analysis for the impact of KM on the relationship between TQM and CS.

Chi²	GFI	CFI	AGFI	RMSEA	Significance	Direct Effects		Paths	t	Significance
13.979	0.851	0.896	0.054	0.312	0	IV–MV	0.65	IV–MV	8.25	0
						MV–DV	0.69	MV–DV	8.88	0

The value of GFI, which is the goodness-of-fit index, reached 0.851, which is close to a perfect fit. The value of the comparative fit index was CFI = 0.896, which is close to a perfect fit. The value of the adjusted goodness-of-fit index was AGFI = 0.054. The RMEA value was 0.312, which approximates zero.

The direct effect of the independent variable on the mediator was 0.65, and this indicates the effect of the independent variable on the mediator. Therefore, the interest

in the independent variable is reflected positively on the mediator. In addition, the direct influence of the mediator on the dependent variable was 0.69, indicating the effect of the mediator on the dependent variable. Moreover, the indirect impact of the independent variable on the dependent variable via the mediator was 0.67.

The test statistic value of the pass analysis for the independent variable and the mediator was 8.25, while the value for the mediator and the dependent variable was 8.88. Both values show the significance of the test based on *p*-values less than 0.05. These results indicate that there is a mediating effect of KM at the level of $\alpha = 0.05$ on the relationship between TQM and CS.

The mean dimensionality of the dependent variable "TQM" ranged between 4.105 and 4.25, with a high degree of appreciation, and the overall arithmetic mean of the variable as a whole was 4.11, with a high estimate. The mean value of "Customer Focus" ranged from 3.8 to 4.43, with a high degree of appreciation. The mean value of "Process Management" ranged from 3.88 to 4.13, with a high degree of appreciation and the highest mean.

The mean value of "Leadership" ranged from 3.83 to 4.16, with a high degree of appreciation and the highest mean. This means that the administrations of the pharmaceutical companies in Turkey are keen to share knowledge with their employees to keep them aware and well organized for any job development, so as to help themselves to handle job tasks, job capabilities, and job responsibilities efficiently. The mean value of the dependent variable "CS" ranged from 3.78 to 4.05, with a high degree of appreciation and the highest mean. This means that the administrations of the pharmaceutical companies in Turkey are keen to practice social and economic sustainability through employees via teamwork to ensure the creation and sharing of knowledge among employees, so as to pass on knowledge important for managing company activities, using the impact of TQM and its dimensions (i.e., customer focus, leadership, and process management) and processes in a proper manner. The mean value of the mediator variable "KM" ranged from 3.57 to 3.95, with a high degree of appreciation and the highest mean. This means that the administrations of the pharmaceutical companies in Turkey are seeking to create and share knowledge among employees to take advantage of the new knowledge to improve the company environment and achieve CS both socially and economically, so as to meet the market's demand for competition.

Based on the obtained results, all of the hypotheses presented positive and significant relationships that support the developed model.

5. Conclusions and Recommendations

Understanding of the fundamental role of knowledge, the disposition of Turkish pharmaceutical companies regarding total quality management (TQM), and their readiness to meet work challenges and maintain better performance was among the main aims of the present study. The results were obtained from investigating five pharmaceutical companies in Turkey. They illustrated that the practice of both total quality management and knowledge management by pharmaceutical companies at the employee level has a major effect in achieving corporate sustainability.

Turkish pharmaceutical companies' administrations ensure that TQM and its components—including leadership, customer focus, process management from internal and external sources, employees' creative ideas, work unbalancing processes, competitors and market trends, and training programs—are considered as basic sources of quality to guarantee the availability and use of knowledge. Their employees improve their abilities and skills in leadership and performing tasks individually based on the concept of sustainability. In addition, it is strongly suggested that companies consider their employees as partners in directing tasks, and help them in managing and acting according to their professional knowledge and ability to deal with TQM efficiently and competently.

Turkish pharmaceutical companies also ensure that creating and sharing knowledge with employees at all levels is one of the basic principles of the company policy toward workflow, in order to overcome functional obstacles such as confusion, work delays,

and negative behavior. Thus, knowledge sharing plays a vital role in management and administrative procedures, along with the high professionalism of employees in performing their job activities. In addition, employees should be able to rely on themselves, and be able to work as a team without referring to administration about the details of their work.

The Turkish pharmaceutical companies confirmed that TQM has a positive impact on employees' work performance. Accordingly, their administrations are striving to build an organizational culture characterized by excellence via providing knowledge to their employees and managing it professionally for the benefit of the company, and they are reducing the risks and costs of the work by conducting TQM correctly.

There are several studies that support our findings. In 2014, Jabeen et al. presented the positive effects of both TQM and knowledge management on the business performance of SMEs [5]. More recently, the crucial roles of knowledge management practices and TQM in sustainability in organizations were investigated [1,6]. However, surprisingly, Abbas [6] stated that TQM has an insignificant relationship with knowledge creation, and that KM has an insignificant relationship with environmental sustainability. These results could inform managers about the effects of the industry, management style, organizational structure, and culture on these areas in practice. On the other hand, Zhang [7] has reported similar results to those of the present study. Different results based on geographical situation represent the importance of tailoring strategies for each construct—or at least for the main ones, namely, TQM, knowledge management, and sustainability. The professional management focuses more on creating value in organizations than on the time, cost, quality, and scope of the work. The main concern is how managers perform these processes in the context of each organization.

Regarding the managerial implications, this study emphasizes the fundamental role of total quality management in five pharmaceutical companies. By demonstrating its effect on corporate sustainability—including both economic and social sustainability—we presented its value to managers who are active in this industry.

We also illustrated the positive effects of total quality management and the commitment of all of the managerial levels in this industry on the value of knowledge. This study used both knowledge creation and knowledge sharing to strongly recommend their vital role in all organizations, and especially in pharmaceutical companies.

Furthermore, the positive direct and indirect effects of performing knowledge management strategies will help managers to achieve organizational sustainability on different fronts, namely, economic and social sustainability.

In summary, employing knowledge management strategies can help improve the total quality management performance and sustainability in the market.

The study has some limitations, as with any study. One of these limitations is that the questionnaires were distributed only to the managers, heads, and assistants of pharmaceutical companies in Turkey, and not to any operational staff. Furthermore, the results were analyzed based on the interpretations of the managers' opinions, rather than being based on any records in pharmaceutical companies in Turkey. Moreover, more pharmaceutical companies should be investigated in this field. In addition, the duration for which the companies have been active in the pharmaceutical industry can be considered to be a potentially influential factor on the TQM in such studies. The maturity of the organization is a crucial factor in such studies, and was not investigated here.

The effect of total quality management on corporate sustainability—including both economic and social sustainability—via the crucial role of knowledge management could be examined in other industries in Turkey. In addition, in future research, instead of choosing knowledge management as a mediator, managerial support could be examined as a moderator variable to investigate how it could enhance the aforementioned effects in different industries.

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Appendix A

Part 1: Demographic Factors of the Study Sample

Please Check (X) the right choice based on your point view

1-Gender

( ) Male   ( ) Female

2-level of education

( ) Diploma Community College ( ) Bachelor

( ) Master ( ) PhD

3-Age

( ) Less than 30 years   ( ) 30—and less than 35 years

( ) 35—and less than 45 years ( ) 45 years and above.

4-Years of Experience

( ) Less than 5 years ( ) 5 and less than 10 years

( ) 10 and less than 15 years ( ) 15 and less 20 years.

( ) 20 years and above.

Part 2: Study Variables

Based on your point view, please indicate your answer of all questions by remarking your answer (X) of the right choice. Numbers 1 to 5 are considered for Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree, respectively.

No.	Contents	1	2	3	4	5
Knowledge management (mediator)						
1	My company concern about new ideas, thoughts, and suggestions proposed by employees.					
2	My company care about motivating and rewarding creative employees.					
3	My company encourage collective work and subordinates cooperation instead of competition.					
4	Each department in my company determines important knowledge in its field to be distributed and exchanged between personnel.					
5	When new knowledge is created, my company filters—adjusts it to be suitable for the work environment.					
6	My company have a comprehensive, adequate knowledge database that is available for all employees.					
7	My company documents newly acquired knowledge for each accomplished project.					
8	My company seek to qualify its employees through scholarship awards to gain knowledge of modern technology in the field of communication.					
9	My company encourages employees to benefit from the experience of successful international practices and knowledge in order to adopt them.					
10	In the case of adopting successful international communication practices, my company modifies these practices to be suitable for Jordanian conditions and the environment.					

No.	Contents	1	2	3	4	5
Total quality management and its dimension (independent variable)						
Customer focus						
11	The organization care about customers' satisfaction and feedback.					
12	The organization uses customer feedback to determine its requirements					
13	The organization designs services according to the client's requirements					
14	The organization keep the customer feedback on the right track					
15	The organization implement a customer satisfaction survey on an ongoing basis					
16	The organization remain in close contact with its clients					
Process management						
17	The company clearly define the objectives of the operations necessary to achieve it.					
18	The company determine the responsibility for managing the operations.					
19	The company manage the interrelationships between operations as a system to achieve quality objectives.					
20	The company analyze the impact of modifications on individual operations on the system as a whole.					
21	The company manage the risks that may affect the result of operations.					
22	The company have standard operating instructions that are given to employees.					
Leadership						
23	Senior management set clear goals of overall quality.					
24	Senior management transfer all quality objectives to employees.					
25	Senior management develop policies based on the concept of total quality.					
26	Senior management serve as a guide to quality.					
27	Senior management allocate the necessary resources for quality.					
28	Senior management reward the quality achievement procedure.					
Corporate sustainability (dependent variable)						
29	The company provides stability and fairness to its workers to achieve social sustainability.					
30	The company ensures the safety of workers and ensures that working hours comply with employment contracts and labor laws to achieve social sustainability.					
31	The company pays salaries and wages on time to achieve social sustainability.					
32	The company supports the local community through donations and supports the education and health sectors to achieve social sustainability.					
33	The company prepares the company's internal accounts and profits to include its surroundings as well as to achieve economic sustainability.					
34	The company trains and recruits workers from the local community and creates jobs to achieve economic sustainability.					

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